A·I·B·S bulletin

NEWS AND VIEWS IN THE BIOLOGICAL SCIENCES

ALAN T. WATERMAN • DIRECTOR • NATIONAL SCIENCE FOUNDATION

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VOL. 1 OCTOBER · 1951 NO. 5

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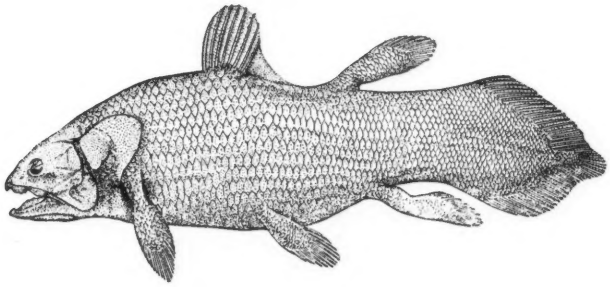

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THE AIBS BULLETIN

Editor, CLARENCE J. HYLANDER; *Managing Editor,* LEONARD D. PIGOTT

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(For a list of AIBS member societies, see page 2.)

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Across the EDITOR'S DESK

• The **TWELFTH INTERNATIONAL CONGRESS OF PURE AND APPLIED CHEMISTRY** (World Chemical Conclave) which took place in New York City September 10-13 included many papers of interest to biologists. In fact, the greater share of the abstracts dealt with problems in organic chemistry and biochemistry many of which overlapped in subject area with numerous biological specialties. Air and stream pollution, microbiological chemistry, medicinal chemistry, pesticides, food and nutrition, and plant cell-wall constituents were a few of the section titles which should be brought to the attention of biologists. A 664-page volume of abstracts (price ($2.50) of the papers presented at the meeting is available from Dr. Harry L. Fisher, Division of Chemistry and Technology, National Research Council, 2101 Constitution Avenue, Washington, D. C. Checks should be made payable to the National Research Council.

• The **AMERICAN PLANT FOOD JOURNAL.** It is possible that many plant physiologists and others who are working in related biological fields are not aware of the excellent publication, "The American Plant Food Journal," which is published by the American Plant Food Council of 910 17th Street, N.W., Washington, D. C. Feature articles are of interest to agronomists, horticulturists, and agricultural chemists. A section headed "Agriculturally Speaking" has some very timely briefs on current biological problems.

• The Director of the **HAWAII MARINE LABORATORY,** Robert W. Hiatt, has brought to our attention the research facilities of that relatively new biological station. His letter follows:

The Hawaii Marine Laboratory of the University of Hawaii was officially opened in April, 1951. Situated within the warm-water belt of the Pacific, endowed with a remarkable series of tidal ponds and tanks, this Laboratory provides access not previously available to research materials in tropical waters. The completion of the first portion of the new research laboratories at Coconut Island has enabled the University to separate its undergraduate and graduate instruction in marine biology given at the Waikiki Branch (formerly the Marine Biological Laboratory of the University) from research activities in this field now shifted to the Coconut Island Branch. These two marine laboratories, coupled with fishery and ichthyological laboratories on the main campus, are now organized into a single administrative unit, the Hawaii Marine Laboratory.

Expansion of these facilities was made possible by the loan of land, buildings, and marine facilities by Edwin Pauley and his associates, owners of Coconut Island. By a special gift from Edwin Pauley and with funds appropriated by the University of Hawaii, the research facilities at Coconut Island have been completed and set in operation.

Through a cooperative agreement between the Regents of the University of Hawaii and the University of California, the Laboratory facilities will be used in common for reseach projects in the central Pacific region. A Board of Advisers from the two universities will govern its policies. So that the maximum value of this Laboratory may be realized, working space will be provided to visiting marine scientists upon approval of their research projects by the Board of Advisers.

While in general no restrictions will be imposed on the nature of research projects, priority for space will be given to those which fall most closely in line with that which the Board considers the most important function of the Laboratory. Generally speaking, the research program will encompass those aspects of marine science which can best be accomplished in the Hawaiian area. No attempt will be made to duplicate facilities for certain types of marine research which can best be done elsewhere. Specifically, the biological program will stress achievement of a better knowledge of the kinds of organisms present in and near the Hawaiian Archipelago, the production and utilization of living organisms in warm seas, and the physiological and evolutionary life processes characteristic of warm water organisms. The developmental and dynamic processes of coral reefs will receive greatest emphasis geologically while the physical and chemical characteristics of inshore and neritic waters will receive most attention oceanographically.

A descriptive brochure containing information of interest to student and research personnel and application forms for visiting investigators may be obtained from the Director.

• The **AAAS PHILADELPHIA MEETING.** Biology will play a prominent part at the 118th Meeting of AAAS in Philadelphia, December 26-31, 1951, in Convention Hall, at the University of Pennsylvania, and in the downtown hotels. Included among the participating societies are: American Microscopical Society, American Society of Protozoologists, American Society of Zoologists, Beta Beta Beta, Biometric Society, Herpetologists' League, National Association of

Biology Teachers, Philadelphia Botanical Club, Phycological Society of America, Society for Industrial Microbiology, and Society of Systematic Zoology. Other societies co-sponsoring AAAS Sectional Programs are: American Society of Limnology and Oceanography, Botanical Society of America, Ecological Society of America, and Genetics Society of America. The annual Sigma Xi address will be "Animal Light" given by E. Newton Harvey. Coupons for hotel reservations and advance registration are in *Science*.

Section F will present symposia on "Invertebrate Hormones," "Estuarine Ecology," and "Sex in Microorganisms." Section G will present symposia on "Radiation Botany," "Foods and People," "The Pine Barrens of New Jersey," and "The Ecology of Disturbed Lands." Section O has a four-session symposium planned on "Mineral Nutrition of Plants, Animals, and Man." In addition, the Society of Systematic Zoology will present a symposium on "The Classification of Animals," and the American Microscopical Society one on "Modern Methods of Microscopy." The Phi Beta Kappa address will be given by Arthur H. Compton, the AAAS Presidential address by Roger Adams.

• The **STANFORD RESEARCH INSTITUTE** of Stanford, California, has sent the following informative letter to the AIBS Office:

Laboratory facilities have been added to implement activities of Stanford Research Institute's new Department of Applied Biology. The Institute, a non-profit applied research organization affiliated with Stanford University, is now undertaking investigations in the biological field as a service to industrial companies and government agencies. Housed in a separate building, the laboratories consist of an animal section of two rooms, an instrument room, a diet-preparation room, a biochemical laboratory, and an operating room. The latter has been equipped for the performance of gross pathological examinations, blood studies, and surgery as required in the course of experiments. The animal quarters are wholly air conditioned and complete for research involving the use of rats, mice, hamsters, guinea pigs, rabbits, dogs, monkeys, chicks, and other experimental animals. Included among the laboratory activities will be metabolism and excretion studies, acute and chronic toxicity investigations, growth and reproduction experiments, biochemical isolations, microbiological studies, use of paper chromatography techniques, and work involving histology and pathology facilities.

Since its organization, the department has engaged in a variety of research problems ranging from toxicity studies to the development of experimental techniques. Work has progressed on the preparation of pyrogen-free water. An investigation in dog psychology is under way. One long-term study seeks to determine the chronic toxicity of a chemical used in the food industry. An extended experimental test is now being conducted on the effects of fluorine on livestock. The improvements and added equipment extend the Institute's biological activities to biochemical, nutritional, and pharmacological studies not only dealing with laboratory animals but also with livestock, fish, and other animals of commercial importance.

• **SECTION G, AAAS, AND BOTANICAL MEETINGS.** Stanley A. Cain, secretary of Section G, adds these comments to those recently published of John S. Karling, 1950 chairman of Section G.

"I believe that any vacuum produced by withdrawal from the AAAS annual meetings of botanical societies should be filled by a program developed by Section G and preferably one that is well rounded and complete.

Certain matters lie within the range of freedom of choice of the individuals and organizations concerned. The AAAS long has been the 'mother' organization with which several botanical societies have met. The AIBS has recently expanded its original purposes to include the sponsoring of society meetings—and this at the request of societies dissatisfied with the AAAS arrangements for such reasons as the large size of the meetings and their occurrence during the Christmas holidays. The AAAS would be the first to confirm the right of a society to meet when and where it pleases. It would wish only to emphasize the advantages of the AAAS for those societies and individuals whose interests extend beyond their specialties.

These advantages have something to do with the trends of the times. Although specialization is important, and the total bulk and spread of botanical science is beyond an individual's capacity to master it all, the modern trend seems to be toward an integration of fields, a tearing down of walls. The major point is evident; only the AAAS can offer the breadth and richness of contacts and experience that more and more scientists are coming to require as supplementary and complementary to their necessarily more circumscribed daily activities. But no organization can offer such opportunities without being large; they are one of the fruits of size.

We should not, I think, bemoan the proliferation of societies. The growth of science in depth and in breadth requires the formation of more and more societies, so that those with special interests can establish and maintain a certain intimacy of contact. But this development requires, also, an opposing force if science is to maintain its most fruitful balance. In addition to societies for the more or less narrow areas, there must also be an opportunity for an easy com-

mingling of the sciences, for a rubbing of elbows by all the different specialists, and by the specialists and the generalists, the technologists and the philosophers, historians, theorists, and educators in science.

My comments are a plea for a second look at the services that the AAAS offers to botany. It is the responsibility of the elected officers of the AAAS to maintain the Association's strength and to increase, rather than to allow to diminish, the services of the AAAS to her membership. As I have said earlier, societies are free to choose whether they meet independently or in conjunction with other organizations. The AAAS, however, must expand its botanical and other offerings to the extent that the needs of its members are not met by the concurrent or separate meetings of affiliated societies.

It is apparent that one major function of the AAAS is the development of invitational programs of broad scientific interest, often transgressing the boundaries of the individual sciences, whether these be lectures, symposia, panel discussions, or conference-type programs. But it does not follow that Section G should not also provide an opportunity for contributed papers. It should provide for such sessions to whatever extent the demand requires. Those authors for whom the time and place of the AAAS meetings are more convenient than those of the AIBS should be given an opportunity to choose. Which is to say, Section G will provide for sessions for contributed papers and will hold the door open for society meetings and, in so doing, will also wish well for the programs of societies meeting separately from the AAAS.

In conclusion I wish to say, as Secretary of Section G and as an active participant in several societies involved in this general situation, that botany in this country is so rich in investigators that there is an annual abundance of contributions adequate for two large programs which may be better than a single, too large program. I am sure that it would be a serious mistake for societies to sever completely their relationships with the AAAS and that a little experience will lead many to this conclusion. There are obvious advantages in a late summer meeting and in meeting in places that cannot accommodate a full AAAS program. When these are weighed against the advantages of meeting with the AAAS many societies will work out a means of eating their cake and having it too—such being the wonders of science. Three alternatives suggest themselves: (1) a choice between the AAAS and the AIBS; (2) alternate meetings, one year with the AAAS, the next with the AIBS; and (3) two meetings a year.

When any or all of the botanical societies wish to meet with the AAAS, they will be welcome; and Section G will expand or contract its program as the changing situation indicates. In the meantime Section G will carry on."

SOCIETY NOTES

The AMERICAN PHYSIOLOGICAL SOCIETY held its autumn meeting at Salt Lake City, Utah, September 6-8. There were 268 papers presented at the sessions, and an estimated 420 attended. The local committee for the meeting included H. W. Davenport, H. L. Borison, J. Z. Bowers, V. D. Davenport, T. F. Dougherty, Con Fenning, L. S. Goodman, C. R. Mott, G. Sayers, D. M. Woodbury, and L. A. Woodbury. Section meetings were held on the following topics: Adrenal Glands, Central Nervous System, Trace Elements and Nutrition, Respiration, Peripheral Circulation, Temperature Regulation, Gastrointestinal Tract; Endocrines and Tissue Damage; Circulation and Respiration; Kidney and Electrolytes; Metabolism; Heart; Effects of Radiation; Muscle; Artificial Respiration. Tours, ladies entertainment, and the society dinner added to the interest of the meeting.

AMERICAN SOCIETY OF PARASITOLOGISTS. The twenty-sixth annual meeting of the American Society of Parasitologists will be held in conjunction with the meetings of The American Society of Tropical Medicine, The American Academy of Tropical Medicine, and the National Malaria Society, on Thursday, Friday, and Saturday, November 15-17. The Congress Hotel will be the headquarters for these joint meetings. Following is the program for the American Society of Parasitologists:

PROGRAM

NOVEMBER 15, Thursday

9:00 a.m.–12:00 noon	Regular session
2:00 p.m.– 5:00 p.m.	Regular session
7:00 p.m.	Dinner and council meeting, members of the council

NOVEMBER 16, Friday

9:00 a.m.–11:00 a.m.	Symposium on "The Ecology of Vectors of Parasitic Diseases"
11:00 a.m.–12:00 noon	Presidential address: "Livestock Parasitology in the United States" by Benjamin Schwartz, U. S. Bureau of Animal Industry
2:00 p.m.– 5:00 p.m.	Demonstration session at Roosevelt College

NOVEMBER 17, Saturday

9:00 a.m.–11:00 a.m.	Regular session
12:00 noon– 1:30 p.m.	Annual luncheon and business session
2:00 p.m.– 5:00 p.m.	Joint session, A.S.T.M., N.M.S., A.S.P.

GENETICS SOCIETY OF AMERICA. In the minutes of the ninth annual meeting of the Genetics Sections of the American Society of Zoologists and the Botanical Society of America, held at Des Moines and at Ames, Iowa, December 29, 1929, to January 1, 1930, there appears a resolution which may be of interest to members of the American Institute of Biological Sciences. It was introduced during a discussion of possible organization of the Genetics Society of America.

The resolution is as follows:

WHEREAS, The geneticists of America are considering an organization independent of the national botanical and zoological societies; and

WHEREAS, The ecologists, the microscopists, and the bacteriologists have already formed independent societies including both botanists and zoologists, thereby splitting up the biologists into numerous small groups; and

WHEREAS, Botanists and zoologists have found it desirable to unite in large enterprises, such as the development and maintenance of "Biological Abstracts" and collaborating in certain research institutions; and

WHEREAS, The joint interests of the two groups of biologists are recognized in the temporary Union of Biological Societies that became responsible for "Biological Abstracts" and in the existing agreement that at convocation week both groups shall meet at the same place; and

WHEREAS, A single large society may act more effectively in advancing certain common interests than numerous small societies,

RESOLVED, That the committee of the geneticists to be appointed to consider the organization of that group enter into negotiations with the officers of the national botanical and zoological societies looking toward the formation of a national biological society, inside which the various special interests may form distinct sections.

It was put in the form of a motion and carried. This resolution, introduced by C. B. Davenport, embodied the general idea of the A.I.B.S. organization.

Back issues of the Records of the Genetics Society of America, Numbers 2-20 are available from the treasurer, Dr. Ernst Caspari, Wesleyan University, Middletown, Connecticut. In a few cases supplies are somewhat limited, but for the earlier issues many copies are on hand. Number 1 is out of print, but Number 2 gives the history and organization of the Society as well as the proceedings of the first annual meeting at Atlantic City, December 27-30, 1932. Individuals as well as libraries may wish to secure certain numbers to complete volumes they have on hand. The price of each number of the Records is $1.00. Membership lists are printed in most numbers of the Records.

FORTIETH ANNUAL POULTRY SCIENCE MEETING. The Poultry Science Association's 40th Annual Meeting was held at the University of Tennessee at Knoxville, August 28-31. About 700 persons were in attendance. More that 100 scientific papers were presented in the fields of Genetics, Physiology, Nutrition, Pathology, Marketing, and General Poultry Husbandry. Agenda on Leukosis, Salmonella, and Poultry Processing were noteworthy.

The 14th presentation of the Borden Award in Poultry Science, consisting of a gold medal and $1000, was given to Dr. Michael Lerner of the University of California. Dr. J. Russell Kouch of Texas A. & M. College received the $1000 award for research in Poultry Nutrition given each year by the American Feed Manufacturing Association.

The A·I·B·Scope

• **THE ROCKEFELLER FOUNDATION** has taken action to support the work of the American Institute of Biological Sciences providing up to $40,000 for the four-year period beginning July 1, 1951. These funds will be used to initiate and expand activities approved by the Governing Board but not as yet self-supporting. With this assistance AIBS can increase its usefulness to both biologists and the public.

• **TWO NEW ASSOCIATES** have been added to the list of industrial and commercial concerns supporting the work of AIBS. These are the Schering Corporation, specializing in Endocrine and Pharmaceutical Preparations, of Bloomfield, New Jersey; and Merck & Company, Manufacturing Chemists, of Rahway, New Jersey. This brings the total of Associates to eleven, seven being similar concerns and biological research groups, four being publishers particularly interested in biological publications.

• **RECENT ADDITIONS TO THE GOVERNING BOARD** include Bentley Glass, of Johns Hopkins University, as the representative of the Genetics Society of America, replacing Paul C. Mangelsdorf; and George S. Avery, Jr., of the Brooklyn Botanic Garden, as representative of the Society for the Study of Development and Growth, replacing B. H. Willier.

At the May, 1951, meeting of the Governing Board, three new committees were authorized and their membership approved. An *Editorial Board of the AIBS Bulletin* under the chairmanship of Ralph E. Cleland of Indiana University includes Harriet B. Creighton of the Botany Department of Wellesley College, David B. Dill of the Medical Division at the Army Chemical Center, Bentley Glass of Johns Hopkins University, and Raymund Zwemer of the Science Division, Library of Congress. An *AIBS Committee on Associates* under the chairmanship of Elmer G. Butler of Princeton University includes as its members B. M. Duggar of Lederle Laboratories, Randolph Major of Merck and Company, Lawrence Saunders of the Wm. B. Saunders Publishing Company, E. C. Stakman of the University of Minnesota, and J. C. Walker of the University of Wisconsin. An *AIBS Committee on Membership*, under the chairmanship of Ralph Gerard of the University of Chicago, includes T. C. Byerly of the Bureau of Animal Industry, Marston Bates of the Rockefeller Foundation, Freeman S. Howlett of Ohio State University, J. G. Horsfall of the Connecticut Agricultural Experiment Station, and R. W. Singleton of Brookhaven National Laboratories. With the creation of these three committees, the respective activities of AIBS in these areas can be undertaken on a broad and progressive approach. The existing *AIBS Publications Committee* continues under the chairmanship of A. J. Riker of the University of Wisconsin, with Ronald Bamford of the University of Maryland, William Duryea of Carnegie Institution, J. M. Sherman of Cornell University, and Milton O. Lee of the Federation of American Societies for Experimental Biology, as members.

• **AN AIBS COMMITTEE ON HYDROBIOLOGY,** advisory to the Office of Naval Research, was organized in Washington, D. C., on August 9, 1951. As its first task the Committee will follow up its resolution that it would be desirable to have a directory of the facilities and personnel in marine and fresh water hydrobiology in North America. The directory planned will be sufficiently analyzed to be useful to beginning scientists as well as to research scholars and administrators in the field. A second confidential report on the status of hydrobiological research today and that proposed for the immediate future will be compiled for use by the Office of Naval Research and other appropriate agencies. Obviously such information must be secured by means of questionnaires. These are now being formulated for distribution by AIBS to all hydrobiological laboratories and personnel engaged in hydrobiological research. The questions will be divided into two groups, one set of which will seek information directly publishable, while the second set will involve privileged answers to be incorporated only in the confidential report. All questions are important and the Committee seeks the whole-hearted cooperation of biologists in this worthwhile contribution to the hydrobiology of North America.

Robert W. Hiatt, of the University of Hawaii, is chairman of this committee. Other members are Arthur D. Hasler of the University of Wisconsin, Carl R. Hubbs of Scripps Institute of Oceanography, Daniel Merriman of the Bingham Institute of Oceanography, and William R. Taylor of the University of Michigan.

• The **AIBS ADVISORY COMMITTEE ON PHYSIOLOGY** to the Office of Naval Research met September 3 in Salt Lake City to evaluate the scientific merit of approximately 30 proposals in the area of physiology. Ralph Gerard, chairman, presided at the meeting.

• An **INTERIM MEETING OF THE GOVERNING BOARD OF AIBS,** including those members present at the Minnesota meeting, was held at Coffman Memorial Union, September 10. Frank P. Cullinan, chairman of the Board, presided; other Board members present were D. B. Anderson, R. E. Cleland, Bentley Glass, and H. B. Tukey. Guests included James L. Morrill, president of the University of Minnesota, and the presidents of the societies participating in the AIBS-sponsored meeting.

• **FUTURE MEETING SITES** for September campus sessions, sponsored by AIBS, are under consideration as a result of the decision of several societies to meet at this time of year, as far ahead as 1955. Invitations from the presidents of Cornell University and of the University of Wisconsin have been accepted for 1952 and 1953, respectively. In 1954 the meeting will be held in the east, but an exact location has not as yet been decided upon. Under consideration are Penn State and several New England universities. Invitations have been received from Indiana University and Michigan State for 1955. It is hoped that by the next meeting of the Governing Board, in May, 1952, exact sites for the 1954 and 1955 meetings can be announced.

Biological Sciences and the University

JAMES L. MORRILL

President, University of Minnesota

An address of welcome presented by Dr. Morrill at the general meeting sponsored by the American Institute of Biological Sciences, September 10, 1951, at the University of Minnesota.

I AM honored, indeed, to have this privilege, which my Minnesota faculty colleagues have given me, of sharing with them in welcoming to our campus what I am told is one of the largest scientific conferences ever to meet here.

Surely, too, it is one of the most important—perhaps the most "vital," I should say—for the subject of your sciences is at the base and beginning of all life.

It would not surprise me if biologists these days felt themselves at some disadvantage in our academic cosmos—considering by comparison the war-won priority of the physical sciences in so far as governmental and industrial support of research is concerned; and considering also the newly and rightly awakened interest in the social and behavioral sciences. If our experience at Minnesota is any criterion, these two groups are receiving more new aid and encouragement than any others I could name, with the exception of the Medical Sciences. Agriculture, in a land-grant institution such as ours, enjoyed the first research priority of all. Fortunately, the basic biologies have been in position to enjoy some overflow from both the medical and agricultural largesse, but the intimations of still a "stepchild status" one occasionally discerns.

The long overdue attention to the social sciences is perhaps the most significant postwar academic phenomenon. It is enormously hopeful and promising.

And yet I am remembering the admonition expressed by Herbert Hoover in his address at the Fiftieth Anniversary of the founding of Stanford University about ten years ago. I thi'k it worth repeating:

"I have wished," he said, "that the economists and sociologists and the governmentalists generally would get together with the biologists. In the long run, society will be built upon the sums of human behavior. And that behavior has deeper roots than wishful thinking and exhortation. Those chromosomes which transmit the behavior of geologic ages ought to haunt the thinking of the social and governmental doctors."

This seems to me a wise reminder, as we study the new techniques of "group dynamics"—or watch by television the treaty-making tensions at San Francisco.

But the heartening thing to the whole academic community everywhere these days, it seems to me, must be the growing public interest in science generally, the growing awareness of its indispensability to the solution of every human problem, and the trust which people seem to feel in the scientist for weal or woe, for war or peace.

When Franklin Roosevelt read the letter from Albert Einstein, declaring that atomic bombs could be built, the President—knowing little of physics or nuclear energy—committed billions to the project. He trusted the ability, and the integrity, of scientists.

This public trust in science brings two thoughts to my mind:

It lays upon universities a larger obligation. It should lay likewise upon the public an obligation more fully to understand and appreciate, to protect and support the nature and function of universities. People must understand that the nature and function of universities is unique in the whole history of civilized societies, that the nurture of science and scholarship is a delicate and precarious undertaking.

I need not spell this out for you. It is instinctive in your understanding. But the public acceptance of science has outrun its understanding of the climate and ecology indispensable to scientific advance, it seems to me—and this lag is the understandable product of the problems and tensions of the time. The short-run physical and ideological defense of the nation has become, curiously, a dangerous deterrent to its long-range defense.

In saying this I am thinking of two things, as a university administrator who has no real function, of course, except service to the advancement of science and scholarship.

The University has two responsibilities to the scientist—two responsibilities which those who support universities by benefaction or public action must likewise somehow come increasingly to learn and understand:

First of all, the University must endeavor to supply the scientist with means for his work—laboratories, equipment, assistants, and time. This means money. Secondly, it must give him the climate of freedom—the atmosphere of independence to go his own productive way, to pick and push the problems of his choice, to range freely and without fear, to communicate his reasoned conclusions without restraint.

All this you understand—but all this the public does not yet fully comprehend, I fear.

Universities are in a period of financial retrench-

(Continued on page 17)

Federal Support of Fundamental Research in the Biological Sciences

ALAN T. WATERMAN

Director, National Science Foundation

An address delivered before the biological societies meeting under the auspices of the American Institute of Biological Sciences, University of Minnesota, September 10, 1951.

It is appropriate indeed that this meeting of biological societies, sponsored by the American Institute of Biological Sciences, should be held at Minneapolis, with the University of Minnesota as host in this its centennial year. It is hardly necessary before this audience to note that this state is nationally and internationally known for its progressive record in the fields of agriculture and medicine. Led by one of the largest and greatest universities of the country, its research is notable in these and other fields of special interest to this meeting, such as botany, zoology, plant pathology, and genetics. When your Chairman invited me to address you on this occasion, I welcomed the opportunity, for it has been the plan of the National Science Foundation to initiate a strong program in fundamental research in the biological sciences.

* * *

FOR something less than a month the question of vital concern to the National Science Foundation has been "To be or not to be." The enthusiasm engendered by the long anticipated action of Congress in finally creating the National Science Foundation last year suffered a sudden chill on August 20 of this year, when the House effected a 98 per cent cut in the $14,000,000 budget recommended by the President for the first year of operation. The answer to our soliloquy awaits, at this writing, a hearing before the Senate Appropriations Committee, with Senate and then joint action by Senate and House to follow. I am sure that you share the hope of scientists, educators, and informed laymen everywhere, that the Congress will decide we are "to be." I need not point out to this group how disastrous it would be for the United States to withdraw its support from so significant a scientific enterprise in this crucial phase of our national existence.

The most serious aspect of the matter is the obvious fact that the public does not yet understand or appreciate the meaning of basic research and the extent to which scientific progress is dependent on the constant flow of new ideas from this source. The distinction between basic research and applied research, which is so obvious to the scientist, is still a subtle one for the layman to grasp. On every hand he sees the fruits of applied research. The subject of scientific research claims an increasing amount of attention by press and radio, and it is perhaps understandable that the average citizen should fail to understand why there should be more money spent on research. It is, therefore, clearly incumbent upon us who do understand the problem to improve our efforts to make clear to the layman the continuing and pressing need for basic research.

Friends of the Foundation have expressed interest in how the Foundation is being organized and what it plans at the outset in the way of a program. Dr. John Field, who is undoubtedly known to most of you, joined our staff on June 8 as Assistant Director for Biological Sciences. We consider it fortunate that the University of California was willing to grant Dr. Field a year's leave of absence as Chairman of its Department of Physiology at UCLA in order that he might organize this important part of the Foundation's work. Dr. Field has made several visits around the country preliminary to making plans for this division. In the course of these trips he has talked to a number of investigators and administrators and has found that many of them had questions in common

THE *National Science Foundation* was established on May 10, 1950. It is governed by a 24-member, part-time National Sciences Board and an executive director. Chairman of the Board is Dr. James B. Conant of Harvard University. Principal responsibilities and functions of the National Science Foundation are (a) to develop and encourage the pursuit of a national policy for the promotion of basic research and education in the sciences, (b) to initiate and support basic scientific research in the sciences through contracts and grants-in-aid, (c) to award scholarships and graduate fellowships in the sciences, and (d) to maintain a register of scientific and technical personnel in the United States.

On appointment by President Truman, DR. ALAN T. WATERMAN became Director of the National Science Foundation on April 6, 1951. Before taking this position, Dr. Waterman had been Chief Scientist for the Office of Naval Research where he had for four years directed the Navy's scientific research program carried on with universities throughout the nation.

During World War II Dr. Waterman served with the National Defense Research Committee as Chief of the Office of Field Service in the Office of Scientific Research and Development and was awarded the Medal of Merit in 1948 for this work.

In 1913 he graduated from Princeton University, and he received his Ph. D. at Princeton in 1916. Following his service with the Science and Research Division of the Army Signal Corps in World War I, he joined Yale's Department of Physics and remained a member of the Yale faculty until 1948 with leaves of absence to King's College in London, to Massachusetts Institute of Technology, and to OSRD from 1942-48.

His research investigations have been in the field of conduction of electricity through solids, in thermionic, photoelectric emission, and allied effects, as well as in the electrical properties of solids.

regarding the Foundation. He and I have agreed, therefore, that in these remarks today I should attempt to answer as many of those questions as possible and perhaps to anticipate some that this group may have.

As I describe organization and plans, I must ask you to bear in mind, however, that the House action has made it necessary for us to suspend all active planning and to halt recruiting. We are therefore marking time until action by the Senate and later by the conferees decides the issue as to whether there is to be a National Science Foundation program for fiscal year 1952.

May I say at this point, on behalf of both the Board and the Foundation, that we have been enormously heartened and encouraged by the magnificent way in which scientific, educational, and industrial groups have rallied to the cause. There has been organized action on the part of a number of groups, and from both individuals and organizations have come reaffirmations of confidence in the importance of the Foundation's mission. Both the efforts on behalf of the Foundation and the messages we have received are deeply appreciated.

Since scientists generally have followed the fortunes of the Foundation through the legislative ups and downs which preceded its establishment last year, and since the Foundation owes its existence in very large part to the support, interest, and hard work of American scientists, I shall not retrace the events which led up to the enactment into law of the National Science Foundation Act of 1950 on May 10, 1950. The appointment of the Board members occupied most of the remaining months of the year, and the Board did not hold its first meeting until December. The Foundation has been about the business of organization and staffing since early in April when the Director took the oath of office.

The Act provides that the National Science Foundation shall consist of a National Science Board and a Director. The Board consists of 24 members appointed by the President, with the advice and consent of the Senate, and the Director ex officio. Board membership is broadly representative of American science, engineering, education, industrial research, and public affairs. The members are drawn from the principal geographical areas of the United States.

The biological sciences are well represented in the Board membership by Minnesota's own Dr. Elvin C. Stakman; Dr. Edwin B. Fred, President of the University of Wisconsin, and Vice Chairman of the Board; Dr. Detlev W. Bronk, President of the National Academy of Sciences, and President of the Johns Hopkins University, who is Chairman of the Executive Committee; Dr. Gerty Cori, winner of the Nobel Prize in medicine and physiology in 1947; Professor James A. Reyniers, Director of the Bacteriology Laboratory of the University of Notre Dame; and Father P. H. Yancey, Chairman of the Department of Biology, Spring Hill College, Alabama. If we do not observe too restricted a definition of "biological sciences," then we should also include Dr. Sophie Aberle, physician and anthropologist, who is Special Research Director of the University of New Mexico; Dr. Orren Hyman, Dean of the College of Medicine of the University of Tennessee; and Dr. Robert Loeb, Director of Medical Services, of the Presbyterian Hospital of New York.

The law also provides that there shall be within the Foundation the following divisions: a Division of Medical Research; a Division of Mathematical, Physical, and Engineering Sciences; a Division of Biological Sciences; and a Division of Scientific Personnel and Education. These divisions are headed by Assistant Directors who are responsible for planning and guiding the work in their respective areas. In addition, there is a Deputy Director; an Assistant Director for Administration who works with the Director on broad questions of policy and planning as they relate to the administration of the Foundation; a General Counsel; and a small staff for administrative and housekeeping functions. Although we are planning to enlarge the staff considerably over its present nominal size, it is our intention to operate with a relatively small staff. Since the Foundation will not operate laboratories of its own but will carry out the substantive part of its operations by means of grant, contract, loan, or other forms of agreement, a large staff will not be required to administer its operations. This then is the bare skeleton of the Foundation and I shall not dwell upon it in further detail, since the anatomical structure of any organization is seldom of very great interest to others.

The significant fact is that for the first time in the history of the United States a truly national science agency has been brought into being and given the specific responsibility of developing a national policy and of supporting basic research and education in the sciences. I want to emphasize, however, that this statement in no way overlooks the National Academy of Sciences, the National Research Council, the wartime OSRD, or any of a dozen federal agencies which are carrying on important programs of research and development. In each case these were created to serve a different purpose and to fulfill different functions.

Besides its broad, policy-making functions, the Foundation has other unique responsibilities. The Act directs that it shall serve as a central clearing house for information relating to scientific manpower and for other types of information relating to the over-all picture of science in the United States. Prior to this time, there has been no real focus for the many factors which are essential in the administration of modern research and development. With an over-all national expenditure considerably in excess of two billion dollars, research and development has become a major enterprise in and of itself, and is a significant factor in relation to the national security, health, and welfare. Most of us are agreed that a recognition of the

importance of science at the policy-making level of government is, therefore, long overdue. It is also especially appropriate that the support of basic research and education in the sciences should be the primary mission of the Foundation. Basic research and the training of young scientists constitute the fundamental bases on which the gigantic superstructure of applied research and technology rests.

At the present time, both basic research and education in the sciences are in some danger of suffering from neglect.

Because of the absence of reliable statistical data as to the relative apportionment between basic and applied research, in terms of the over-all effort, it is difficult to say just how much money is being specifically earmarked for basic research. An uneducated guess would place the over-all average at something like 5 per cent of the total. Out of the original budget of $14,000,000 recommended by the President for the Foundation's first year of operations, the sum of $8,155,000 was planned for the support of basic research in the medical, biological, mathematical, physical, and engineering sciences. In terms of government expenditures today, this is surely a modest enough sum for so important an objective.

Funds for basic research were apportioned among the three major breakdowns prescribed by the Act as follows: $3,913,000 for the mathematical, physical, and engineering sciences; $2,600,000 for the biological sciences; and $1,300,000 for the medical sciences. In view of the range of subject matter covered by the Division of Mathematical, Physical, and Engineering Sciences, it is thus apparent that biological sciences are destined to enjoy a very substantial portion of the total support—about one-third. The second major portion of the budget, $5,060,000, was to be allocated for graduate and postdoctoral fellowships.

Before I leave the subject of budget, I should like to say a few words about our plans for the fellowship program, since this is a matter to which we have attached considerable importance because of its influence on the scientific manpower shortages. Our original plans called for the allocation of something over five million dollars for graduate and postdoctoral fellowships. At the outset at least, emphasis was to be on graduate work, in the interest of augmenting as quickly as possible the supply of scientific manpower. We had planned to utilize approximately 10 per cent of the funds authorized by Congress for purposes of launching a pilot fellowship project to be initiated at the opening of the winter term in 1952. In order that we might launch this pilot program at so early a date, it was our intention to call upon the National Research Council for its advice and assistance in arranging for the many details which must be taken care of.

The award of fellowships will be on the same broad base as that applied to the support of basic research. All graduate students pursuing basic research in mathematics and in natural sciences and engineering fields are eligible to apply for these fellowships. Ability will be the primary criterion applied in the selection of candidates.

Fellowships will be available to first, second, and third year graduate students and to postdoctoral fellows. Until we know definitely what action Congress is going to take regarding funds for programmatic operations, we shall not be in a position to discuss our plans in detail. I can say, however, that stipends will be in gradually increasing amounts, the lowest award being made to first year graduates, and the highest amount to postdoctoral fellows. Present plans also call for family and travel allowances. It is, of course, particularly unfortunate that the difficulty regarding the Foundation's budget should have arisen at the very time when action should be well under way toward the preparation of the pilot program for the coming year.

Another budgetary item which has aroused considerable interest is that of scientific information. The problem in all its aspects—that is, preparation, publication, dissemination, indexing, abstracting, cataloging, and so on—is one which cuts across all disciplines. The Foundation recognizes the scope and complexity of the problem and has established a scientific information office in order that there may be a focal point for an organized attack on some of the most pressing aspects. In our original budget we planned an allocation of the order of $285,000 to be utilized for scientific information in various ways including especially research in methods leading to an improvement of communication among scientists. Since no organized attack can be launched, however, until we have additional staff and further time to study the matter, I shall not go into any details but would like to assure you that the subject is one in which we plan to take an active interest.

I turn now to that aspect of the program which is a subject of special interest to this group, and that is the support of biological research.

If it is safe to make any generalizations at all with respect to government support of the natural sciences, it is probably true that the biological sciences have tended in the past to enjoy proportionately less support than the physical sciences. There are a number of reasons for this, the most obvious being, of course, the relatively greater cost of support in the physical sciences. Another reason is that to the average lawmaker and administrator, the clear, economic applications of biological research are less apparent. Until comparatively recent years, the outstanding example of government support in the biological sciences was the agricultural research program of the Department of Agriculture. It is not necessarily a foregone conclusion, however, that all who have enthusiastically endorsed the Department of Agriculture program have realized that they were advocating support in the biological sciences as such. There is a special magic associated with whatever helps the farmer.

In recent years very significant additional government support has been given to research in the life sciences through the programs of the Atomic Energy Commission and the National Institutes of Health.

War, of course, has a certain influence on the emphasis on various disciplines. It has been said that World War I was the chemists' war, World War II is the physicists' war, and World War III—if our worst fears should be realized—might be the biologists' war. Those who have dedicated their lives to acquiring further knowledge of the processes of life would be loath, I know, to see the enlargement of this important branch of knowledge turned to destructive purposes just as many physicists have been appalled to witness one of the practical applications of theoretical nuclear physics.

But the reassuring aspect of the whole matter is that the utilization of new knowledge seems ultimately to swing toward the positive and creative side, even though it may have been developed originally for military purposes. In the few years that have elapsed since the close of World War II we have witnessed important adaptations of military research to peacetime purposes. The production of radioisotopes and the development of tracer techniques such as those which grew out of the atomic energy program have furnished both biological and medical research with important new tools. Microbiology has received new impetus from wartime research on the antibiotics.

Thus, if bacteriology must be given more than normal emphasis and support in order that this country may deal effectively with biological warfare—should that be used against us—the really significant aspects of such research over the long haul will undoubtedly lie in its contribution to the conquests of disease and knowledge of fundamental processes such as energy conversion. Since biological warfare presents a threefold threat to man, crops, and animals, we must necessarily advance our knowledge on these three fronts simultaneously, thereby increasing the sum and total of our knowledge in three important areas.

It has been my intention to suggest, by way of background for the comments to follow, that although the biological sciences are now enjoying a significant measure of federal support, principally through the National Institutes of Health, the Department of Agriculture, and the military programs; and although a modest portion of this effort can be regarded as basic research, by and large, the research in the biological sciences being supported with federal funds is directed research in the sense that it is directed toward the solution of practical problems. The novel and important aspect of the Foundation's effort will be its absolute freedom from any limitations with respect to practical application.

This, in short, is the answer to one of the questions Dr. Field most frequently encountered in his swing around the country, namely: How basic will the basic research be that the Foundation is willing to support? Emphasis will be on basic research, and preference will be given in that direction whenever practicable. As you are well aware, there is no clearly marked line of demarcation between what is basic and what is applied. Often one shades into the other, and therefore each proposal will be considered as an individual problem.

We are gratified by the character and extent of the interest in the biological sciences which has been evidenced in the three months that the division has been in operation. Dr. Field and his staff have received approximately 75 proposals in various stages of formulation. All sections of the country and many states are represented in these proposals, and there is interesting diversity in the fields which include:

Biosynthesis and Degradation
Physico—Chemical properties of Biological Molecules
Plant Physiology and Photosynthesis
Marine Biology
Chemical Genetics
Comparative Biology
Experimental Zoology
Environmental Physiology
Microbiology
Endocrinology
Biophysics

Another question that has been frequently asked is: What criteria will be applied in the selection of projects for support? I am glad to be able to say that the primary criterion will be scientific merit. This must necessarily be judged very largely on the basis of the competence of the investigator. In the case of young investigators who have not yet had the opportunity to earn their reputations, the faith that their teachers or their research supervisors have in their abilities will be an influential factor.

The primary purpose of the Foundation is to develop a hard core of first-rate research of very fundamental nature by competent investigators. This objective will be the first factor taken into consideration as the merits of various proposals are weighed. Of course, the Foundation must necessarily strive for a certain amount of balance among the several fields in which research is desirable in order that all the available funds may not be concentrated on one subject at the expense of others which are also worthy of investigation. Such balance will be achieved in general terms, however, without the rigidity of apportionment.

The Foundation will give sympathetic consideration to competent investigators who may be working with limited facilities in adverse environmental conditions, or possibly in small institutions which lack the "selling power" of the big institutions with established reputations.

It has been proposed that advantage be taken of the opportunities of certain regional locations which offer

specialized environmental conditions. The University of Hawaii, for example, offers practical facilities for marine biological research. Such places as Alaska and desert regions provide opportunity for inquiries related to their special terrain and climatic conditions.

Proposals will be reviewed by men experienced in the fields under consideration. Subject to the approval of the National Science Board, the plan is to name an advisory group of nine men, serving for staggered terms of office, so that there will at all times be seasoned members of the group, while fresh points of view are brought in from time to time. This basic group will appoint, as needed, *ad hoc* groups to consider special problems as they arise. Our present thinking is that such a system would give us the double advantages of being able to call upon expert advice whenever it is needed, and at the same time to enjoy a degree of flexibility that is not possible in a more rigid organizational pattern.

In fact, we hope that this kind of flexibility will carry over into many aspects of our operations. We have been asked how much latitude investigators will have for changing their minds in the midst of a project—for altering the direction of their investigations. It is our intention to permit the investigator as much freedom as possible in plotting the course of his investigation, but the Foundation must reserve the right to discuss any change in the aim of the investigation or its scope.

I have several times been asked why the Foundation attempts to distinguish between biological research and medical research. Biologists incline to the point of view that, strictly speaking, most medical research could be defined as biological research. The obvious answer is, of course, that Congress specifically provided for a Division of Biological Sciences and a Division of Medical Sciences, hence there are two separate programs. This seems to me to be a perfectly defensible plan, since medical research, in addition to implying the study of disease, commonly brings to bear upon its problems a point of view essentially different from that of biological research in somewhat the same way that engineering differs from physics or chemistry.

And now let us turn to some of the administrative details of Foundation support. There have been a number of inquiries concerning these. The most frequent question is probably the form that Foundation support will take. Under the broad terms of the National Science Foundation Act, support may take the form of grants, contracts, loans, and other forms of assistance. The Foundation, therefore, enjoys considerable leeway in deciding the type of assistance that will most effectively meet a specific situation. After some preliminary investigation of the whole subject, and after consultations with other public and private groups with experience in supporting research, we have reached the conclusion that, generally speaking, the grant is the form of assistance most suitable to the support of basic research. This does not mean, however, that other forms will not be used as seem desirable.

Every effort will be made to hold administrative "red tape" to the minimum consistent with the proper accountability for public funds. For example, progress reporting will be generally on a semi-annual or annual basis. Accounting procedures will be made as simple as possible. Researchers will be encouraged to publish in scientific journals, and pertinent articles will be accepted as scientific reports.

There have been questions as to whether the term of the grant will include provisions for travel. The Foundation recognizes the importance of scientific meetings, congresses, and conferences, and reasonable provision will be made for travel for such purposes and for other relevant purposes which could be expected to have a directly beneficial effect on the problem at hand.

Another question of considerable concern to the investigator is: What time limit will be placed on projects? The consensus among researchers and research administrators is that one year is too short a time in which to expect effective results. In appreciation of this fact, the Foundation will award its grants most frequently for two- or three-year periods, and in exceptional circumstances for longer periods, but will not make commitments exceeding five years. These are, of course, subject to renewal.

Some of the questions that occur to you are undoubtedly among those to which we should like the answers ourselves. The manpower situation in the biological sciences, for example, is a subject on which we should like to have more specific information than is presently available. The demands of the defense program have produced disturbing shortages in scientific and technical manpower of all kinds. Apparently the shortage is not so acute in the biological sciences as in some of the physical sciences and in engineering. The Committee on Specialized Personnel, of the Office of Defense Mobilization, in a preliminary survey of resources and requirements of specialized personnel, estimates a total professional employment in the fields of biological, agricultural, and medical sciences of approximately 50,000. Of this number, about 30,000 persons are employed in the biological sciences at the professional level. Of these, the largest number is employed by educational institutions, and the others are to be found in government agencies, hospitals, research institutions and foundations, medical and commercial laboratories, and industrial organizations.

Comprehensive data on employment trends in the biological sciences are unfortunately not available, but some conclusions can be drawn from the fact that the number of doctorates granted annually in these fields has increased from fewer than 100 in 1912, to nearly 1,000 in 1950. But even though manpower shortages in the biological sciences may not appear to be so

acute as in other fields at the present time, we should not wish to see any reduction in the rate at which new scientists are being produced. We must recognize, also, our inability to predict fully what the needs of a few years hence may be. We should not wish to find ourselves caught in the same situation with respect to the biologists as that in which we now find ourselves with respect to the engineers. A couple of years ago, on the basis of the perfectly sound data then available, the prediction was made that the supply of engineers would shortly exceed the demand and that the employment outlook in those fields was not too encouraging. The sudden advent of the Korean war upset these calculations completely, and we now find ourselves in the midst of a truly critical shortage of engineers.

There is another aspect of the matter that I should mention before someone in my audience reminds me of it. During World War II biologists played a distinguished role in fields other than their own. I believe the physicists in the Radiation Laboratory at M.I.T. were somewhat nonplused when biologists were first brought in to work on radar but later confessed that they were doing extremely well in this special realm of the physicists and engineers. Dr. Britton Chance, who received his Ph.D. in biology at Cambridge in 1942, and who served with such distinction as a member of the Radiation Laboratory staff, is a brilliant illustration of the point I am making.

Biologists were also found to be a "natural" for the highly specialized problems of operations research, where their experience in dealing with great masses of unspecified data made them particularly valuable for some of the diffuse problems submitted for operational analysis. It would probably be surprising to the layman to realize, also, that biologists played a prominent part in the redesign of aircraft carriers and the arrangement of planes on the carrier decks. A number of other examples will undoubtedly come readily to your minds, but these few will suffice, I think, to emphasize my point that in both cold war and in full mobilization, biologists will continue to be in great demand.

A question which seems to be with us always in one form or another is that of the status of the scientist and student with respect to Selective Service. The Universal Military Training and Service Act, which was signed by the President on June 19, 1951, takes cognizance of the importance of permitting students to complete their training. The new law states that "Any person who while satisfactorily pursuing a full-time course of instruction in a college, university, or similar institution, is ordered to report for induction . . . shall, upon the facts being presented to the local board, be deferred (a) until the end of such academic year, or (b) until he ceases satisfactorily to pursue such course of instruction, whichever is the earlier." Current selective service policies provide for continuing deferment for students who maintain high scholastic standards. These scholastic standards are adjustable, however, and can thus be used to regulate, to some extent, the flow of students into military service. The provision of the law I have just cited is specifically directed toward undergraduate students, but the same section is applicable to graduate students also. However, Selective Service plans at the present time to consider deferable any graduate student who is satisfactorily pursuing a full-time graduate program.

The National Science Foundation was particularly glad to see amended an earlier Selective Service rule that excluded from its definition of "full-time graduate program" any part-time teaching, research, and so on, on the part of the graduate students. The effect of this rule was to render ineligible for deferment those graduate students who found it necessary to increase their incomes by some form of supplementary work. New instructions to local boards interpret the phrase, "a full-time graduate program," to mean any combination of course work, thesis work, research, and teaching which is considered to be suitable for advancing the student in question toward his degree at a satisfactory rate; this rate is specified as one which will lead to a master's degree in two academic years or a doctorate in four academic years. Responsibility for determining whether a student is progressing satisfactorily is delegated to the Dean of Graduate Studies of each institution concerned.

This change in ruling is of considerable significance to the Foundation's fellowship program. If it had not been changed, many promising students would have required full fellowship support in order to remain in deferred status. The more satisfactory interpretation thus enables the Foundation to make its fellowship dollars go as far as had been intended originally.

The new Act also grants the President considerable leeway in specifying which occupations shall be designated as critical for purposes of deferment from selective service. The employer must still apply to the local board for the deferment of an employee, but all scientific fields are now considered critical, and it is to be hoped, therefore, that research scientists will not be inducted in any great numbers.

There are still many respects, of course, in which the scientific manpower situation, in relation to the needs of the Armed Services, needs further attention and planning, but we can feel that at least progress has been made, in that there is growing recognition of the importance of scientists to the national welfare in all stages of their training.

So much, then, for some of the questions which have been most frequently asked of the Foundation and some to which we ourselves do not know all the answers. If this brief résumé leaves you with other questions, we shall be glad to answer them as we can, if you will bring them to our attention.

Our first year program, as I have attempted to describe it for you briefly in these remarks, constitutes a limited approach to problems of inestimable mag-

nitude. Whether or not we shall be able to carry out any part of these plans is, of course, dependent upon the action which Congress may take in the next few weeks. The relatively small amount which the President initially recommended to enable the Foundation to undertake the support of basic research and the training of young scientists is certainly no measure of the much larger results which may emerge as time goes on.

It is unfortunate that scientists, who understand so well the relation between basic research and the training and development of creative young minds, have been able to convey to the laymen only imperfectly the importance and urgency of this matter. After having marshaled, for the benefit of the legislative hearings which preceded the establishment of the Foundation, a massive array of evidence from scholars, educators, scientists, industrial experts, military leaders, and others, we find ourselves in the position of arguing the case all over again.

In support of the vital importance of basic research and scientific education it is an easy matter to summon the effective testimony of contemporary experts, but I think it is interesting to note that no one has stated the case with more beautiful precision and clarity than did the great Thomas Huxley. Speaking[1] more than sixty years ago of the advance of science in the preceding half century, he said:

> And if physical science, during the last fifty years, has attained dimensions beyond all former precedent and can exhibit achievements of greater importance than any former such period can show, it is because able men, animated by the true scientific spirit, carefully trained in the method of science, and having at their disposal immensely improved appliances, have devoted themselves to the enlargement of the boundaries of natural knowledge in greater number than during any previous half century of the world's history.

If Huxley could make this statement as he stood on the threshold of the twentieth century, how much more truly can we make it today as we, in turn, enjoy the fruits of his labors and those of his great contemporaries who helped to lay the foundation of our modern age of scientific achievement.

[1] Thomas Henry Huxley, *The Advance of Science in the Last Half Century*, D. Appleton and Co., New York, 1887.

Biological Sciences and the University

(Continued from page 10)

ment in the very moment of greatest national income and expenditure. This is a strange inconsistency.

The invasion of the intellectual autonomy of universities is no less a cause of concern.

The Communist ideology is all-inclusive as we know. It strangles science as well as independent-mindedness of every kind. It is completely inconsistent with any concept of academic freedom—and the idea of political collaboration with the Kremlin must be more unconscionable to the scientist than to any other kind of patriotic citizen.

In a time of war, or threatened war—and war today is, above all, science geared to destruction—every precaution of military security and political reliability is justified.

We in universities still have a job of education and interpretation to do that is as old as the history of scientific struggle itself. We must be patient and persistent and persuasive. We have made enormous gains, despite the understandable setbacks at the moment.

Not least of the values in this assemblage of distinguished scientists, I surmise, is the reassurance that comes from the fellowship of men devoted to the highest ideals of human welfare; men uniquely trained and competent in the service of science and society.

We at the University of Minnesota are honored and greatly stimulated by your presence. I hope your meeting will be not only fruitful, but enjoyable as well —and that looking back upon this convention, you will remember our University as we wish it might deserve to be regarded: as a cordial and cooperative host.

The AIBS Publications Committee would like your assistance in standardizing literature citations. Please note questionnaire on p. 21.

The University of Minnesota Meeting

CLARENCE J. HYLANDER
Executive Secretary, AIBS

THE American Institute of Biological Sciences sponsored its second fall campus meeting for biologists a few weeks ago at the University of Minnesota. The first was held last year at Ohio State University, Columbus, Ohio. President Morrill described the 1951 meeting as the largest gathering of scientists to assemble on his campus. The attendance exceeded all pre-convention estimates, but dormitory and eating facilities on campus were adequate to take care of the 1500 who came to Minneapolis. Conference and meeting rooms were in campus buildings, each only a short distance from the dormitories. Coffman Memorial Union, one of the best-equipped student union buildings in the country, provided ample space for the Biological Sciences Exhibit Hall, various society headquarters as well as that of AIBS, main registration and information center, the visible index, and numerous lounges for relaxation between sessions. It was also the locale of the Biologists' Smoker.

Eleven biological societies took part in the meeting: the American Society for Horticultural Science, the American Society of Human Genetics, the American Society of Plant Physiologists, the American Bryological Society, the American Society of Naturalists, the American Society of Plant Taxonomists, the Botanical Society of America, the Ecological Society of America, the Genetics Society of America, the Mycological Society of America, and the Society for Industrial Microbiology.

An analysis of the registration attendance at the meeting indicates that Botanical Society of America had the greatest representation, with 389 members present. The American Society for Horticultural Science came a close second with 305. These figures correspond proportionally to the attendance at Ohio State last year, where the representation was 418 for Bot. Soc. and 335 for the ASHS. The American Society of Plant Physiologists had a representation at Minnesota of 243—seven more than were present at the Ohio State meeting. The Genetics Society of America had 200 members present (in contrast to the 311 at Ohio State at their Jubilee Meeting). Other society attendances at Minnesota were: Ecological Society of America, 116; Mycological Society of America, 101; American Society of Plant Taxonomists, 80; American Society of Naturalists, 70; American Society of Human Genetics, 56; and the American Bryological Society and the Society for Industrial Microbiology, each 30. A surprising number of registrants (152) indicated that they had at the time no society affiliations. As was done last year, where these registrants indicate a desire to join a particular society, their names will be forwarded to the society secretaries. The total attendance based on registration was 1220; due to overlapping memberships this figure is not the sum of the above society representation. Wives and other non-registered guests brought the total attendance to an estimated 1500.

It is always interesting to note the geographic distribution of the registrants at a national meeting. Even though biologists have the reputation of being extremely conservative about venturing far from traditional convention sites in the eastern part of the country, a surprising number came to Minneapolis from distant states. The following is a summary of the attendance of those with ten or more representatives from a state:

Minnesota	147	Missouri	35
Wisconsin	110	Pennsylvania	32
Illinois	103	Florida	27
New York	89	Mass., D.C. (each)	22
Michigan	70	New Jersey	20
California	62	Tennessee	19
Iowa	59	Kansas, Georgia (each)	16
Maryland	52	Washington, N.C. (each)	15
Ohio, Indiana (each)	47	Va., Texas, La. (each)	14
Canada	38	Okla., Nebraska (each)	12

Also represented were Alabama, Arizona, Arkansas, Colorado, Connecticut, Delaware, Idaho, Kentucky, Maine, Mississippi, Montana, Nevada, New Hampshire, New Mexico, North Dakota, Oregon, Rhode Island, South Carolina, South Dakota, Utah, Vermont, West Virginia, Wyoming, Puerto Rico and Hawaii. Foreign members came from Norway, Sweden, England, Brazil, and Nova Scotia.

Prior to the meeting, the Ecological Society of America had a three-day field program at the U. of M. Biological Station at Itasca State Park, in northern Minnesota. Also before the meeting, the American Society of Bryologists had a field trip beginning in Duluth and taking in the North Shore of Lake Superior. During the meeting, numerous tours and demonstrations were arranged for both society members and their wives, including visits to the Green Giant Company at LeSueur, Northrop King and Company, and General Mills.

The meeting opened on Sunday, September 9, with various council and executive board conferences and with the opening of the Biological Sciences Exhibit Hall. All available space in the main ballroom was occupied by the 25 booths provided exhibitors from those publishers, biological supply houses, and instrument concerns interested in the biological sciences.

An important function of a national meeting is the opportunity it provides teachers and research workers to get first-hand information of new books, instruments, and materials which are essential in the development of their research techniques and the success of their teaching programs. All exhibitors were carefully screened before being invited to participate: the result was an exhibit hall in which every contributor had something of vital interest to the biologists attending the meeting.

The American Institute of Biological Sciences arranged a meeting on Monday evening, at the opening of the sessions, for members of all the participating societies. President Morrill of the University of Minnesota gave a short address of welcome, outlining the relation of the university to biological sciences. The keynote address of the evening was given by Alan T. Waterman, Director of the National Science Foundation. His timely topic, "Federal Support of Fundamental Research in the Biological Sciences," was given before an audience of more than a thousand society members. The AIBS also sponsored a symposium on "The Economics of Journal Publication" with A. J. Riker of the University of Wisconsin, chairman of the AIBS Publications Committee, presiding. Representative journal editors, as well as representatives from different types of printing establishments (Monumental Printing Company, Science Press, and Judd and Detweiler), took part in the discussion.

During the next three days each society had its sessions at which scientific papers were presented; many societies also participated in a number of joint symposia where subject interests crossed the society borders. One of the advantages of a joint meeting of biological societies is the opportunity it provides for allied biological fields to share in each other's advances in knowledge. Of the 589 papers presented at the sessions, 263 were those of the Botanical Society of America, 149 by the American Society for Horticultural Science, 81 by the Genetics Society of America, and 61 by the Ecological Society of America.

An important aspect of the meeting are the symposia and forum discussions on broad aspects of biological science. The American Society for Horticultural Science held a joint symposium with the National Committee on Fertilizer Application; this included such timely topics as the "Future of Leaf Analysis as a Diagnostic Tool for Determination of Fertilizer Requirement of Fruit Crops" and "Use of Fertilizer Solutions in Leaf Feeding." It met with the American Society of Plant Physiologists in a symposium on "Why Plants Grow Where They Do." Another interesting symposium of the horticulturists was "Investigations in Polyploidy of Fruits."

The American Society of Human Genetics presented a symposium on "Human Genetics and Human Welfare." The presidential address, delivered by Lee R. Dice of the University of Michigan, dealt with "Heredity Clinics: Their Value for Public Service and for Research." An open house at the Dight Institute, located in the Zoology building, added to the interest of the sessions.

The American Society of Naturalists included in its program a symposium on "Patterns of Cellular Organization." The presidential address, by Paul C. Mangelsdorf of Harvard University, had as its subject "Evolution Under Domestication."

The American Society of Plant Physiologists carried on most of its sessions jointly with the Physiological Section of the Botanical Society of America. In addition a symposium on "Organic Acid Metabolism in Higher Plants" was presented. At the annual banquet, K. V. Thimann gave the address of the retiring president and Birgit Vennesland the Stephen Hales Lecture.

The Botanical Society of America, as usual, had its sessions organized in various sections. Some of these included symposia of general interest; among these were "Vegetation of the Upper Great Lakes Region" in the systematic section, "Experimental Work on Teaching of Botany" and "Sequence of Subject Matter in General Botany" in the teaching section, and "Phylogeny and the Fern-Pteridosperm Complex" in the paleobotanical section.

The Ecological Society of America's program at Lake Itasca included a Terrestrial Ecology trip (the Maple-Basswood-Prairie Ecotone, Mary's Lake Deer Enclosures and Twin Lakes Bog Succession) and an Aquatic Ecology trip. The campus meeting included a symposium, "The Definition, Evolution, and Significance of Ecological Niches for Animals" and "The Application of Ecological Knowledge to Water Conservation." Joint sessions with the Grassland Research Foundation included a symposium on "Ecology of Grassland Utilization in Central United States." There was also a joint meeting with The Nature Conservancy.

The Genetics Society of America had a program almost entirely of contributed papers; in addition this society had a joint symposium with the Naturalists on "Patterns of Cellular Organization." The Mycological Society of America held numerous joint sessions with the microbiological section of the Botanical Society of America. Jointly with the Society for Industrial Microbiology there was presented the annual lecture of the Mycological Society on "Molds, Mutants, and Monographers" by Charles Thom of Port Jefferson, N.Y.

The meeting last year at Ohio State University was the first large-scale campus meeting of biological societies; even though an initial attempt, it proved so satisfactory that the same group expressed a desire for another fall campus meeting under AIBS spon-

sorship this year. The University of Minnesota generously offered its facilities for the purpose, and cooperated effectively to make this year's meeting a most satisfactory one. At the request of many of the AIBS societies a 1952 fall meeting is planned, with Cornell University as host; and a 1953 fall meeting, with the University of Wisconsin as host. Biologists should appreciate this willingness of university administrations to invite them to their campuses, since it is no simple matter to provide adequate accommodations for several thousand visitors for a three-day period.

A few irrelevant—and perhaps irreverent—thoughts come to the mind of the writer as he reviews the Minnesota meeting at a safe distance in Washington. It is said on good authority (if not direct from the Pentagon itself) that an army moves on its stomach. It seems also to be true that one's remembrance of a convention, as to its being a success or a failure, is based more on how one was housed and fed than on the scientific impact of the various papers and symposia. If this is so, then the sumptuous quarters of Centennial Hall (@ $2.00 a night) or the filet mignon banquets (@ $3.00 a plate), the courteousness of the University of Minnesota hosts and their general hospitality and foresight in taking care of the biologists' physical wants should put this meeting on record as a great success.

Also contributing to the success of the meeting might well be such biological novelties as the charming hostesses provided by Bob Philips for the Biologists' Smoker; the reappearance of the beard as a badge of a learned scientist, as courageously displayed by Paul Voth; and the marriage of science, art, and humor in such after-dinner speeches as that of Dr. Blakeslee at the Bot. Soc. banquet.

And let us not forget that the success of such a meeting is due in large measure to an active local committee, in this case under the competent chairmanship of Sheldon Reed and the vice-chairmanship of William Alderman.

Next year the AIBS-sponsored campus meeting will be at Cornell University. Farewell Minnesota, hail Cornell . . .

The BIOLOGY LIBRARY

One copy of each publication submitted for listing should be sent to the Editor, The AIBS Bulletin, 2101 Constitution Avenue, Washington, D. C.

Books Received . . .

Algae of the Western Great Lakes Area. By G. W. Prescott. 933 pp. Cranbrook Institute of Science, Bloomfield Hills, Michigan, 1951. $10.50.

Animal Evolution. By G. S. Carter. 361 pp. The Macmillan Company, New York, 1951. $4.50.

Bacteriology (5th ed.). By Robert E. Buchanan and Estelle D. Buchanan. 655 pp. The Macmillan Company, New York, 1951. $6.00.

College Zoology (6th ed.). By Robert W. Hegner and Karl A. Stiles. 873 pp. The Macmillan Company, New York, 1951. $6.00.

Ecological Animal Geography (2nd ed.). By W. C. Allee and Karl P. Schmidt (based on work by Richard Hesse). 674 pp. John Wiley & Sons, Inc., New York, 1951. $9.50.

Foundations of Biology (7th ed.). By Lorande L. Woodruff and George A. Baitsell. 698 pp. The Macmillan Company, New York, 1951. $5.50.

Functional Mammalian Anatomy. By William T. Taylor and Richard J. Weber. 529 pp. D. Van Nostrand Company, New York, 1951. $7.25.

Genetics in the 20th Century. By L. C. Dunn. 621 pp. The Macmillan Company, New York, 1951. $5.00.

Human Organism and the World of Life (Rev. ed.). By Clarence W. Young and G. Ledyard Stebbins. 864 pp. Harper & Brothers, New York, 1951.

Insect Control by Chemicals. By A. W. A. Brown. 780 pp. John Wiley & Sons, Inc., New York, 1951. $12.50.

Man and the Living World (2nd ed.). By E. E. Stanford. 835 pp. The Macmillan Company, New York, 1951. $5.50.

Manual of Phycology. By Gilbert M. Smith. 363 pp. Chronica Botanica Company, Waltham, Mass. 1951. $7.50.

Measurement of Linkage in Heredity (2nd ed.). By K. Mather. 144 pp. John Wiley & Sons, Inc., New York, 1951. $1.75.

Naturalist's South Pacific Expedition: Fiji. By Otto Degener. 296 pp. Paradise of the Pacific, Ltd., Honolulu, 1949. $5.00.

Nitrogen in the Life of Plants. By Dimitrii N. Prianishnikov (trans. by S. A. Wilde). Kramer Business Service, Madison, Wisconsin, 1951.

Physical Biochemistry (2nd ed.). By Henry B. Bull. 344 pp. John Wiley & Sons, Inc., New York, 1951. $5.75.

Principles of Human Geography (6th ed.). By Ellsworth Huntington (rev. by Earl B. Shaw). 772 pp. John Wiley & Sons, Inc., New York, 1951. $6.25.

Zoogeography of the Land and Inland Waters. By L. F. de Beaufort. 184 pp. The Macmillan Company, New York, 1951. $5.00.

IN WHAT FORM DO YOU LIKE TO FIND LITERATURE CITATIONS?

Most biologists agree that uniformity in citations is preferable to the great variations now encountered from one publication to another. Based on the short vote taken in connection with the A.I.B.S. Columbus meeting last year, and a more recent sample vote among certain editors and librarians, the A.I.B.S. Publications Committee is preparing a guide for literature citations. To approach more nearly what readers desire, the Committee is sending out this ballot to secure a vote on the more critical items.

Probably no one system will meet the needs of all groups. The results of this vote, however, will indicate how most people feel about certain critical points.

Will you please help by marking the appropriate places to indicate your preferences.

Please check Preferences

I. *In which sequence do you prefer citations to literature?*

A. Alphabetical order according to authorship .....
B. Numbered in the order of appearance in text .....

II. *Authorship*

A. Do you like the initials of second and subsequent authors to be reversed or in natural order? Examples:
Smith, R. E., Jones, A. J., and Brown, E. F. .....
Smith, R. E., A. J. Jones, and E. F. Brown .....
B. Do you prefer "and" or "&"? Examples:
Smith, R. E., and A. J. Jones .....
Smith, R. E., & A. J. Jones .....
C. Do you prefer a woman's name spelled out or merely with an initial? Examples:
Johnson, Barbara .....
Johnson, B. .....
D. Shall names appear exactly as on the publication or be abbreviated to initials? Examples:
Moore, George W., and Howard L. Hansen .....
Moore, G. W., and H. L. Hansen .....
E. With more than two names, should all be given or only the first name followed by *et al.*? Examples:
Smith, R. E., A. J. Jones, and E. F. Brown .....
Smith, R. E., *et al.* .....

III. *Titles of articles or books*

A. Do you want titles included? ..... Yes..... No.....
B. If you mark A "yes," should long titles be shortened? ..... Yes..... No.....

IV. *Abbreviations of journals*

Which list of abbreviations do you prefer?
A. Chemical Abstracts .....
B. Index of American Botanical Literature .....
C. International Catalog .....
D. U. S. Department of Agriculture .....
E. World List .....
F. Other List (please name it) .....

V. *Position of date*

Where should the date appear?
A. At the end. Example:
Cook, M. T. The diseases of tropical plants. 317 p. London, 1913 .....
B. Following the authorship. Example:
Cook, M. T. 1913. The diseases of tropical plants. 317 p. London .....

VI. *Illustrations*

Shall the illustrations be indicated?
A. No mention of illustrations .....
B. The simple abbreviation "illus." .....
C. Details, such as "2 pl., 5 figs." .....

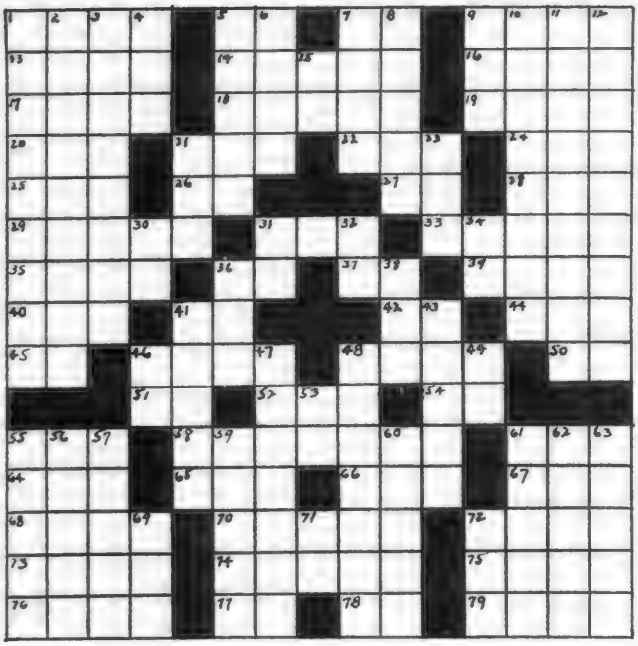
VII. *Publisher of a book and his location*

Shall the publisher be included as well as the place of publication? Examples:
A. McGraw-Hill, New York .....
B. New York .....

Please indicate any special interest you may have in these questions, and add your further comments.

Please tear out this ballot and mail before November 15 to A. J. Riker, Chairman, A.I.B.S. Publications Committee, Dept. Plant Pathology, University of Wisconsin, Madison 6, Wisconsin.

BULLETIN CROSSWORD PUZZLE



HORIZONTAL

1. Blood (comb. form)
5. Artificial language (Foster's)
7. *Scientiae Baccalaureus*
9. Alphabet
13. Pertaining to the ear
14. One of a group of acids obtained from protein by hydrolysis
16. A folding or doubling
17. Genus *Mentha*
18. Feudal lord's demesne; estate
19. . . . .bilis; melancholia
20. Nothing's here
21. Mixture of oxygen, nitrogen, and other gases
22. Repartee
24. Subject of an ode by Keats
25. Sneezers like Ragweed
26. Neon (abbr.)
27. Cerium (abbr.)
28. Hawaiian garland
29. Pigment in a drying oil forming an opaque solid adherent
31. A sebaceous cyst
33. Manuel . . . . . Camacho, President of Mexico, 1940-46
35. Man's name (same back and forth)
36. Male equivalent of "She"
37. Lindbergh and "The Spirit of St. Louis"
39. Anathema to the Soviets
40. Spanish king
41. Therefore
42. Note this well
44. Mounted (abbr.)
45. Yard
46. Network
48. Horticulturists' exemplar
50. Unit in electrostatic system
51. Direction toward
52. American naval arm (abbr.)
54. In the matter of
55. Sign of a happy theater manager
58. Rawboned; edgy
61. Signal of distress
64. Rap lightly
65. Genus *Anguilla;* apodal fish
66. Genus *Hedera;* creeper
67. *Pileum*
68. In the same place
70. Vivacity of imagination
72. Brief autobiographical sketch
73. Genus *Pinus*
74. Ventral side
75. Composer of verses
76. Paradise
77. Secundum artem (abbr.)
78. New Style (calendar)
79. Hostelries

VERTICAL

1. Production of a single kind of spore, microspore or megaspore
2. Whitened by excluding sunlight
3. Less than half of the whole
4. Autumn month (abbr.)
5. *Boehmeria nivea;* shrub yielding textile fibers
6. Tent-making poet
7. Aqueous vapor of the atmosphere precipitated in frozen crystalline form
8. Containing boron
9. A wing
10. Disease of nervous system caused by bacillus infecting spoiled food
11. Establish an orderly connection
12. Early colonizers in Latin America
15. Inclusion within limits
21. Family *Formicidae*
23. *Thea sinensis*
30. Word of response expressing denial
31. You and I
32. Northwest
34. Green Mountain State (abbr.)
36. Having heat
38. To upend
41. Bristlelike organs
43. Fruit having fleshy pericarp
46. Egyptian sun god
47. Fresh-water flagellate
48. Invigorate
49. New England
53. Susan cut short
55. Stalk or slender support
56. Irrationally extreme in opinion
57. Give a formal opinion
59. Birthmark
60. To turn aside
61. Shoot for grafting
62. Made of the *Avena*
63. Emit spawn, as oysters
69. Goddess (L.)
71. Road (abbr.)
72. Poly of Virginia (abbr.)

By LEONARD D. PIGOTT.

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